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February 12, 1949

SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE

Power for Atom-Smasher

See Page 99

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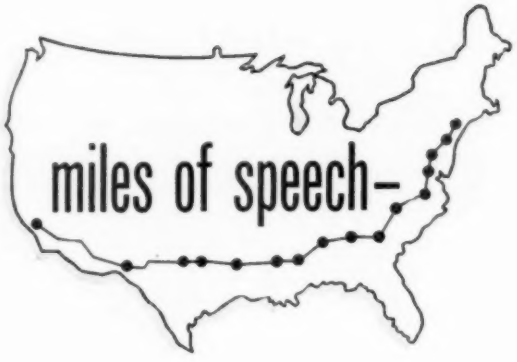

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NUCLEAR PHYSICS

SynchrotronMakesMesons

This powerful new atom-smasher has produced cosmic ray particles by radiation. First direct evidence that this can be done.

See Front Cover

CREATION of the mysterious cosmic ray particles called mesons from the world's most powerful X-ray beam was reported to the American Physical Society in California by Dr. Edwin McMillan of the University of California Radiation Laboratory.

Dr. McMillan said that the cosmic ray particles had been made in the laboratory with the 300,000,000 electron-volt synchrotron.

Production of mesons by radiation in the synchrotron is believed to be the first direct evidence that these potent particles can be made from electro-magnetic radiation. Light, heat, electricity and radio waves are forms of electro-magnetic radiation. Another is the X-ray beam of the synchrotron.

The synchrotron, invented by Dr. McMillan, uses electrons, negatively charged electric particles, to bombard a heavy metal target. This creates the powerful, highly-penetrating X-ray beam.

The atom-smasher is three times as powerful as its cousin, the betatron, another type of electron accelerator; and several times as powerful as three smaller operating synchrotrons, two in England and one in the United States, which have a capacity of 70,000,000 electron volts or less.

Finer Atom-Smashing Tool

The synchrotron is a finer atom-smashing tool than the giant cyclotrons. The fine radiations it produces are expected to duplicate many of the phenomena observed in bombardments with the heavy nuclear projectiles—protons, deuterons and alpha particles—of the cyclotrons.

In addition, the synchrotron may produce cosmic ray showers similar to those found in nature, and may be the means for determining if neutrons and protons are divisible.

Vibrations caused as 160 kilowatts is thrown into and drawn out of the 135-ton electro-magnet cause parts of the machine literally to shake. The concrete foundation vibrates, in spite of the rubber pads on which the machine is mounted, and the synchrotron almost appears to be dancing a jig.

A loud noise accompanies operation. As the machine is turned on, a low thumping is heard, and this builds up to a loud, regularly spaced hammering as the magnet reaches full power, a noise akin to a high-powered diesel engine. Observers have remarked that this is an atom-smasher in which the atoms can be heard to crack.

The synchrotron is based upon the concept of phase stability which during the postwar period has revolutionized atom-smashing and upon which are based the billion-volt machines now on the drawing boards.

This concept is the theory of phase stability, originated independently by Dr. McMillan and the Russian scientist, Veksler, in 1945. This theory circumvents the Einstein relativity principle which had apparently put a ceiling on the energies to which particles could be accelerated.

Theory of Relativity

Relativity states that as a particle gains energy it gains mass; and while the particle, when it becomes heavier, can still be accelerated, this can be done only at a slower rate. In prewar atom-smashers this meant that as projectiles reached higher energy they would lag and fall out of step with regularly timed pushes of prewar atom-smashers.

The synchrotron gets around this in a unique way. As the electrons reach higher and higher energy, the power of the field of the magnet is increased proportionately. The result is that the laggard electrons are jerked up to the acceleration point in time to be propelled to higher energy.

Electrons are accelerated in a doughnut-shaped quartz chamber, two meters in diameter, which is placed between the ring-shaped poles of the electro-magnet. The quartz chamber is silver plated, except for a short section, a gap at which point the particles are propelled.

When electrons are injected into the chamber, they are first hustled around the orbit by the sheer force of the magnet acting on the particles. Up to 2,000,000 electron volts, the machine thus operates as a betatron.

At 2,000,000 electron volts, high frequency power is poured on the silver plating of the chamber, making it a resonant cavity. Operation is timed so that as the electrons reach the gap in the cavity, the far side of the gap is positively charged. This attracts the electrons violently across the gap, speeding them up. By the time the electrons go around the circle again, the current has gone through a complete cycle, and the electrons receive another push. The oscillator providing the accelerating current is capable of reversing the alternating power 48,000,000 times a second.

The magnet guides the particles around the orbit.

The synchrotron goes through a full operation six times each second. For each operation, lasting for a period of one-thirtieth of a second, a "flight" of electrons is accelerated to full energy. Each "flight" tours the chamber 480,000 times before it reaches 300,000,000 electron volts. By the time an electron reaches that energy, it weighs 600 times what it did at rest.

When a flight of electrons reaches peak energy, the oscillator is turned off. The electrons, no longer receiving accelerating impulses, spiral inward, strike a heavy metal target, and liberate X-rays.

Power Stored in Condenser

Power for the synchrotron magnet is stored in the largest condenser bank in the world, which acts like a storage tank as shown on the cover of this week's SCIENCE NEWS LETTER. The "tank," consisting of 3,328 condensers and storing 100,000 joules, is kept full by an ordinary power line.

During the one-thirtieth second operations, this tremendous power is switched into the magnet and back into storage again by four ignitrons. The power loss is small, and this makes for economy.

The magnet has a field strength of 10,000 gauss, stands 98 inches high, 194 inches long, and 92 inches in breadth.

Dr. McMillan's chief associate in construction of the machine was Marvin Martin, engineer in the Radiation Laboratory.

TINY TUBES FORM CLAY—This tubular structure of a common red clay called halloysite was discovered by studies with an electron microscope, which magnified the clay up to 60,000 times. This picture of halloysite and other clays was made at Pennsylvania State College by Thomas F. Bates, Fred A. Hildebrand and Ada Swineford.

They were assisted primarily by Drs. Robert Serber, Wilson Powell, A. C. Helmholz and by George Farley and Leslie Cook, all of the Radiation Laboratory scientific staff. Walter Gibbins was in charge of the work crew.

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NUCLEAR PHYSICS

Beam of Atomic Bullets

➤ THE world's most powerful beam of protons, a special kind of atomic bullet, has been fired by the giant cyclotron at the University of California. The protons pack 350,000,000 electron volts of energy.

This was reported to the meeting of the American Physical Society in Berkeley, Calif., by Dr. Kenneth MacKenzie, who collaborated with William Brobeck, assistant director of the Radiation Laboratory, in designing new equipment for the machine.

The 4,000-ton cyclotron has been the world's most powerful since it went into operation in 1946. But heretofore it accelerated only deuterons, the nuclei of heavy hydrogen atoms, and alpha particles, the nuclei of helium atoms. Protons are the nuclei of ordinary hydrogen.

New equipment installed in the machine in December makes it possible now for Berkeley scientists to switch at will from one to another of the three types of atomic bullets. Operation of the machine is a part of the University's research program for the Atomic Energy Commission.

In a second scientific paper, Dr. Robert Thornton, physicist in charge of the big machine, said that neutrons produced in bombardments by the protons range in energy up to 350,000,000 electron volts. The previous top energy for neutrons was the 100,000,000-electron-volt-beam produced by deuteron bombardments with the same cyclotron.

When the protons strike target atoms, the smash-up produces mesons, the penetrating cosmic ray particles first made in the laboratory at Berkeley in alpha particle bombardments.

Research with the protons will enable scientists to penetrate farther into the atomic nucleus and to learn more about its structure.

Acceleration of protons was made possible by changes in the oscillator, which supplies the radio frequency power to drive the atomic bullets around the cyclotron chamber. The change was necessary partially because the proton, only one half the weight of the deuteron, travels faster.

With protons, the oscillator starts out by giving the particles a push 50,000,000 times a second. By the time the bullets reach their top energy they have become somewhat heavier and begin to lag; to compensate for the lagging, the pushes at this point come 30,000,000 times a second.

For deuterons, the accelerations at the beginning are 25,000,000 per second and 17,000,000 a second when they reach their top energy.

At 350,000,000 electron volts, the protons have a velocity of 125,000 miles per second (two-thirds the velocity of light). About 1,000,000,000,000 emerge from the atom-smasher each second.

The new oscillator is capable of putting out 100 kilowatts of high frequency power, comparable to a high-powered radio station.

Dr. Thornton said the 10-foot wall of concrete surrounding the cyclotron is sufficient protection for personnel against the high energy radiations.

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Question Box

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PSYCHOLOGY

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INVENTION

Weight On Casting Line Is Made Expendable

➤ BAIT-CASTING fishermen know that a weight is an advantage in getting a good, long cast; but then there's the nuisance of dragging the thing back through the water. Henry L. Oliver of Durango, Colo., and Mina B. Anderson of Albuquerque, N. Mex., provide an expendable weight that tears loose at the end of the cast. On this they have received patent 2,460,526.

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GENERAL SCIENCE

Peace Through Science

UNESCO is trying to build international knowledge in science to overcome the war-breeding fear caused by ignorance. This is its fight for peace.

By WATSON DAVIS

This survey of UNESCO's science activities was written from Paris.

➤ IN a world that seems dangerously at odds, there is one field in which almost all people agree. That is the field of science.

In Paris there is mankind's most valiant effort to unify the world in education, science and culture. It is called UNESCO. This synthetic name is made up of the initials of the United Nations Educational, Scientific and Cultural Organization.

These initials have become almost a magic symbol of the hope that the world can be kept at peace in the future. In the parts of the world where there is free flow of information and where people learn what is going on, there may be found some idealistic yearning that this approach will bring results even where the general political set-up of the United Nations is blocked.

When I arrived in Paris and took a taxi to the UNESCO House in Avenue Kleber, I saw that the taxicab driver raised his eyebrows and shrugged his shoulders disdainfully as he said "Hotel Majestic". I understood his feelings when I learned that this grand old hotel had been the headquarters of the Nazi Army High Command during the occupation of Paris. Its subsequent use by the U. S. Army and UNESCO has not yet erased this stain.

There is something significant in the fact that the world's greatest intellectual hope of international cooperation is housed where Nazis trampled liberty-loving Frenchmen.

Science at Core

The hard core of UNESCO is science, although the "E" and "C" are active and important. This not just because the first director general of UNESCO was Dr. Julian Huxley, brilliant British biologist, who has just been succeeded by Dr. Jaime Torres Bodet, former minister and education secretary of Mexico. Science so permeates the international structure of the world's future that, in addition to a vigorous science department, it bulks large in UNESCO's education, information and reconstruction efforts as well as the exchanges of knowledge and experts that it promotes.

Never before in the history of the world has there been a focal point of science on the scale and scope of UNESCO's Natural Science Department. Its activities extend into the tropical forests of the Amazon, where 13 countries have been aided in forming an institute to explore and make useful the vast area of the greatest river in the world. UNESCO's science reaches into the highest mountains where man can live. An inquiry into high altitude and conditions of living a mile to three miles above sea level is being undertaken this year. To keep the deserts from encroaching on the food-producing lands of the world, another institute is being discussed. This arid zone inquiry is of great interest to the Near East and the scientific studies may make the deserts bloom and provide more resources for the world.

Another UNESCO plan is to provide "mechanical brains" for the use of scientists of all nations where intricate computations can be done. High speed computations will help us in the future to forecast the weather, chart the trend of population, capture more accurately the motions of the heavenly bodies and predict famine or over-production of food.

In past centuries learned men and scientists set up their own international networks of knowledge through personal correspondence. The scientific world is too large for this to be the only way today of international interchange. UNESCO has given encouragement and support to the international unions in science which provide regular congresses and conferences in astronomy, chemistry, biology, genetics and many other fields.

Scientific Branch Offices

To serve four major areas of the world, UNESCO has set up scientific branch offices in China, India, Egypt and Uruguay. These are "task forces," to learn what is going on in those areas and to serve the people and the scientists there with knowledge from the rest of the world.

The complex problem of getting the world's knowledge into use both by scientists and by the public is being solved. Scientific journals are being aided in their

UNESCO'S LEADERS—Key figures in the work of UNESCO, shown here preparing for a CBS broadcast from Paris, are right to left: Dr. Jaime Torres Bodet, director-general of UNESCO; David Schoenbrun, CBS correspondent in Paris; Dr. Pierre Auger, head of UNESCO's Natural Science Department; Dr. Frank J. Malina, deputy head of UNESCO's Department of Natural Sciences; and Watson Davis, director of Science Service. Standing (left): William E. Purnell, head of the Science Cooperation Offices of UNESCO.

work of publicizing scientific organizations and the indexing of all the world's scientific knowledge is being surveyed. Realizing that science can only be effective in making a better world if it gets to the people, another effort is to promote the popularization of science through press, radio and magazines. A flow of young scientists and expert professors from one country to another is occurring through UNESCO's support.

In universities, schools and research laboratories in war-devastated Europe and Asia, thousands of students and professors are using scientific apparatus sent them by UNESCO. Some of this apparatus is war surplus now doing a peaceful job. This is substantial aid to the training of scientists of the future. Along with the apparatus itself there have been sent machine shops and materials from which apparatus is made on the spot. This equips laboratories for teaching science and doing research.

Scientists are concerned with the way in which the world uses the knowledge they create and for that reason UNESCO is studying the social implications of technology and knowledge. The world has only a limited amount of natural resources which must be conserved and renewed as they are used. Experts in conservation, in biology, agriculture, and engineering will meet in a world conference this summer under UNESCO auspices, to consider how the world can keep its natural heritage.

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GENERAL SCIENCE

By-Pass Credit for Result, World Agencies Advised

➤ THERE is a good chemical word that is getting into the vocabulary of those who are trying to keep peace in the world today. The word is "catalytic."

All the United Nations efforts, all the Marshall Plan activities are in their essence catalytic—if they are to be most effective with the least cost of time, money and effort.

The trick is to get someone else to do what you want done without doing it yourself. "Catalytic" is just a way of saying that in one word with a scientific flavor.

The world itself must do the job of keeping itself out of war and building for the future—in education, science and culture as in UNESCO and in industry and production as in the ECA. These agencies—beehives of people, paper and plans—are most effective as the persuaders, the instigators or the catalysts.

In this catalytic business of rebuilding and creating, the goods are best that go out unlabeled. The smartest pilots of the international alphabetical agencies are philosophical about the inadvisability of labeling the end products as UNESCO, ECA, or even UN and USA. This is a tough although realistic conclusion, for the money to carry on the work must come from Congress or the equivalent international public bodies, persuaded by public pressure and publicity. Always the administrator is tempted to wave his own banner and inject his name or his organization's name into the things being done. And the people, being human, like names and personalities which they identify with institutions and ideas for good or bad.

The shopkeeper, farmer or industrialist in France would rather put himself and his corner of the world back on its feet without foreign help—that is, without bowing continually before the Marshall Plan. To be sure, he needs and wants the aid. The essential fact is that he must feel that because of his participation in the world's progress—not just France's progress—he has as much right to the aid as the American people have the right to proffer it. It is a mutuality and not an economic conquest.

So it is with the United Nations Educational, Scientific and Cultural Organization headquartered in Paris. Never before have different professions, nationalities, spirits and viewpoints gathered so effectively under one great physical and intellectual roof. But again it is not UNESCO that is the desired end result. People and organizations at the grassroots of your and my own home town must do the job for the most part and get the credit. Problems of the tropical forests can be solved actually in the Amazon and not in Paris. Go to the deserts to apply the torrents of knowledge needed to make the arid zones fruitful. Education is sterile without people learning.

This push for peace may be successful if we take the results and let the credit go.

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GENERAL SCIENCE

UNESCO Tries to Create Better Understanding

By DR. PIERRE AUGER

Head of UNESCO's Natural Science Department, speaking over CBS from Paris Jan. 22, on "Adventures in Science".

➤ THERE are two aspects of science that concern UNESCO: Science is a creative activity of the human brain. On the other hand, it makes profound changes in man's way of life. All of UNESCO's efforts are directed towards creating better understanding between men and, consequently, towards a lasting peace.

Scientific activity by its very nature has a universal character. That is why for many centuries, scientists of all nations have been able to correspond actively on their work and form a kind of brotherhood which has never known any frontiers. At the time of the Renaissance these ties were established in the form of exchange of letters. At the present time, powerful scientific unions have been formed through whose intermediary all scientific discoveries circulate in international circles. One of UNESCO's jobs is to maintain these contacts and help create new ones.

But science during the last two centuries has invaded all spheres of human activity. It has transformed industry and economy, daily life, and philosophical ideas. We must therefore bear in mind not only a rather restricted group of men who have a direct responsibility in the advancement of science, but all those who are more or less directly affected by the results of this progress. UNESCO must make known to the greatest possible number of people, not only the scientific achievements and their applications, but the trend of scientific progress. The public must be constantly informed of living science, that is of science under construction. The public must expect new and important scientific progress in the future. It must not lose its head over new developments to come.

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GENERAL SCIENCE

Scientists Are Example of International Cooperation

By DR. JAIME TORRES BODET

Director-General of UNESCO, speaking over CBS from Paris, Jan. 22, on "Adventures in Science".

➤ SCIENCE is dedicated to truth. I think everyone will agree to that. We have a conviction that peace can be achieved by truth. Truth, science and UNESCO are essentially a single enterprise. Scientists themselves have for hundreds of years demonstrated the possibility of international cooperation—Indian, French, Egyptian, Swedish and scientists of practically all other nations are working together because they know that one nation cannot be without the other. All nations are interdependent in seeking for scientific knowledge as they are in political and economic fields.

While UNESCO works with scientists of all nations, the results are for the benefit of all the people.

Scientists pool their efforts within UNESCO, but what we call the world center of scientific liaison is not just for the benefit of the few professionals. It is an effort to make scientific knowledge more accessible to everyone. We are encouraging the popularization of science as has been done so effectively in America. The great objective of UNESCO's intellectual cooperation is to improve the living conditions of the great associations of human beings.

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The *castor bean*, from which castor oil is obtained, is not a true bean and not even remotely related to leguminous beans; the plant on which it grows is a first cousin to the Para rubber tree.

Much new information was obtained last year concerning the coral reefs and both animal and vegetable life deep under the water off the Bermuda Islands by scientists equipped with *diving helmets* covering the head only.

NUCLEAR PHYSICS-CHEMISTRY

New Energy Source Ahead

A new kind of chemical reaction has been discovered in the atomic pile which may give a new source of energy. It may also eliminate the radiation danger.

➤ UNEXPECTED new sources of chemical energy may be present in the atomic piles now operating, when chemists learn to control and produce when needed a new kind of chemical reaction revealed in the Atomic Energy Commission's fifth semiannual report. This new discovery may allow application of atomic energy without the deadly danger of radiation.

After irradiation in the atomic pile, potassium chloride, a salt almost exactly like table salt, is found to have the chlorine in its structure changed to sulfur. The chemist might have expected the resulting material to be potassium sulfide. That would seem to be a simple substitution of one element for another in combination with the potassium.

Instead the scientists find, on examining the resulting salt, that the newly formed sulfur has combined with oxygen as well, forming an entirely different material. This is potassium sulfate, sometimes used in fertilizers. It would not have been formed by any process with which chemists have been familiar up to now.

Explanation of the difference lies in the field of energy. Potassium chloride has its elements joined with a chemical combining power of one. The sulfur which comes out of the pile as potassium sulfate has had this power increased to six times as much.

The chemist calls this increase oxidation, because it usually accompanies combination with oxygen. It can accompany reaction with other elements as well. It must usually be brought about by supplying energy, in the form of burning fuel, electric current or the like. Its opposite is reduction. Chemists want some materials oxidized, others reduced. But a highly oxidized material may often be used to reduce some other substance.

If the enormous power present in the atomic reactors can be used not only to transmute elements but to raise them at the same time to higher states of chemical energy, as seems to be foreshadowed in the report, the result will be compounding an additional source of industrial energy with that already being used for isotope production. This will mean more efficient use of present atomic power. Possibly it can be a way toward solving one of the greatest problems in harnessing atomic energy for the future, that of applying the power at a distance from the dangerous radiation that surrounds the atomic furnace.

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NUCLEAR PHYSICS

French Pile for Research

➤ FRANCE will produce its own radioactive elements for treating cancer and other diseases, although it has no intention of making atomic bombs.

Dr. Frederic Joliot-Curie, leading atomic scientist of France, said that perhaps within two years, when a second atomic pile is put into operation, it is hoped that France will be self-sufficient in radioisotopes for medicine and industry as well as research.

Dr. Bertrand Goldschmidt of the French Atomic Energy Commission explained that the new French atomic pile would have to run 50 centuries before it would produce enough of the man-made element, plutonium, for one atomic bomb.

The atomic bomb variety of uranium is not separated in the new French pile, and only a thousandth of a gram of plutonium is made each day.

"About 2,000,000 days would be required to produce two kilograms, which the Smyth Report officially issued in America says is less than the amount necessary (to build an atomic bomb)," Dr. Goldschmidt pointed out.

Dr. Goldschmidt escaped from France after the Nazi invasion and played an important role in the development of the Canadian atomic energy project at Chalk River, Ont., before returning to France after the war.

"We shall welcome from America and other countries isotopes for more extended research and for industry and for curing diseases," he emphasized.

Dr. Joliot-Curie disclosed that he hopes the second French pile, rated as a medium power atomic furnace, will be ready in less than two years. It will operate at about 1,000 kilowatts compared with only a few kilowatts for the first pile at Chatillon, near Paris.

France's present atomic pile, aside from being the first one known to be in operation outside of English-speaking countries, is unique in technical respects. It is called, technically, a heavy water-uranium oxide pile, first of its kind in the world. Brown oxide of uranium is the raw material for the operation of the pile instead of the pure metal.

Emphasizing the peaceful aims of French atomic development, Dr. Joliot-Curie declared, "We expect to add to our knowledge and the world's knowledge of atomic processes."

Practical atomic power is another goal, because France "is a country which needs new sources of energy for its development," the French scientist added.

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AERONAUTICS

Two New American Rockets Will Be Used for Training

➤ TWO new American guided missiles, developed for the U. S. Air Force, were just revealed although both have undergone extensive testing. Both are powered with liquid fuel rocket motors, and are to be used in training launching crews.

One is the Consolidated Vultee 774, which is 32 feet long. It is the first Air Force missile approaching the size of the German V-2, which was 45 feet in length. The second is the North American NATIV, 13 feet in length. Both rockets have been fired without incident several times since the tests began last summer. Both achieved supersonic speeds.

The NATIV was developed primarily for aerodynamics research and development of control systems, although it will also be used in launching training. It has obtained an altitude of more than 10 miles. It is fired from a tall metal tower, moving on guide rails during the first few seconds of its journey.

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LIQUID-FUEL ROCKET LAUNCHED—The NATIV, U. S. Air Force rocket test missile, shoots from the metal framework of the tower through which it travels on guide rails the first few seconds of flight.

BIOCHEMISTRY

Tests Prove Radioactivity Doesn't Speed Plant Growth

➤NEW evidence that radioactive elements as such do not make plants grow faster is presented in the fifth semi-annual report of the Atomic Energy Commission. Increased quantities of radioactive materials now available made possible the testing of 21 different kinds of plants, ranging from field crops like corn and soybeans to garden vegetables like carrots and tomatoes, in sites located in 15 states all the way from North Carolina to Washington. All results were negative.

These tests, which were designed to repeat on a critical and controlled basis the conditions claimed to produce greatly increased plant yields from the bombed soil of Hiroshima, have nothing to do with the use of radioactivity as a label or tag on fertilizer elements such as phosphorus. In the latter tests the aim is simply to find out how much of the "tagged" element the plant takes out of the soil and what it does with it. Tests of this sort have been quite successful.

Use of radioactive bombardments to change the genes or hereditary units in plants, speeding up the production of new and useful varieties, is also regarded as promising.

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INVENTION

Small Heater in Glass Keeps Your Drinks Hot

➤ KEEPING your glass of hot milk (or hot toddy) really hot gave some concern to Donald E. Keller of Millersport, Ohio, so he arranged for a neat little recess in the bottom of the glass, into which a small heating electric lamp is fitted. This neat gadget is covered by patent 2,460,309.

Science News Letter, February 12, 1949

SAFETY

Farm Accident Bill Totals $1,000,000,000 Yearly

➤ THE national bill for farm accidents runs to almost $1,000,000,000 a year.

More than half the average U. S. wheat crop for a year could be produced in the time lost through accidents to farmers.

These figures were reported by Maynard Coe, of Chicago, director of the farm division of the National Safety Council, at the National Conference on Rural Health. The conference is sponsored by the American Medical Association.

More than a third of the annual 19,000 accidental deaths on American farms, Mr. Coe stated, occur in homes. Falls, burns, poisons, suffocations, firearms and drownings are the principal causes. Farm work causes 4,300 accidental deaths per year.

Motor vehicles account for about 1,000 fatal accidents in farm work and for more than 6,000 deaths of rural residents in accidents not in line of work.

Nonfatal farm accidents total 1,500,000 annually, with many of the victims crippled permanently.

"A farm safety program means the changing of some of the basic habits of 27,000,000 people," Mr. Coe said. "Their habits of work, play, driving and living must be altered to eliminate the causes of accidents."

A warning that much of the gain in control of tuberculosis in cows may be lost because farmers have become complacent was sounded by Dr. Walter R. Krill of Ohio State University.

Farmers have done well in control of "filth borne" diseases but could do better, C. W. Kruse, associate professor of sanitary engineering at Johns Hopkins University, told the conference.

Science News Letter, February 12, 1949

PUBLIC HEALTH-VETERINARY MEDICINE

Germs from Animals and Poultry Are Health Menace

➤ GERM diseases of animals and poultry are a health menace to farmers that must be constantly watched, Dr. H. B. Mulholland of Charlottesville, Va., warned at the National Conference on Rural Health in Chicago.

The conference is sponsored by the American Medical Association.

Undulant fever, tularemia, also known as deer fly fever, Rocky Mountain spotted fever, ornithosis, horse sleeping sickness, rabies and lockjaw are the special diseases he mentioned as ones farmers need to guard against.

Undulant fever is caused by germs that cause contagious abortion in cattle. It remains, Dr. Mulholland said, one of the foremost problems of medicine today and causes untold suffering and economic loss in humans, cattle and swine.

Measures used to control tuberculosis in cows have not been satisfactory in reducing undulant fever in cattle, he said. Unless the latest antibiotic, aureomycin, proves effective, the treatment of the chronic human infection is discouraging.

Tularemia is of major importance in causing serious illness in humans in many rural areas, particularly in the South, Dr. Mulholland said. The principal carrier of this disease is the wild rabbit, but other species of animals can spread the disease to humans.

Ornithosis, which is related to parrot fever, may become of major importance to farmers. The virus that causes it is found in pigeons and barnyard fowl. A recent epidemic was traced to Long Island ducks. Fortunately, Dr. Mulholland said, the disease is mild and responds to penicillin treatment.

Science News Letter, February 12, 1949

IN SCIEN

NUCLEAR ENERGY

Plan New Public Reports On Atomic Energy Soon

➤ WE ALL are going to learn more about atomic energy. This was promised by Chairman David E. Lilienthal of the U. S. Atomic Energy Commission as the Commission's fifth semiannual report was made to Congress.

Chairman Lilienthal said that a more extensive report on the handling and disposal of radioactive wastes from atomic operations will be issued to the public shortly. This follows disclosure of the reports of scientists at a conference on the subject recently.

Other reports and publications scheduled for public release within the next few months include:

Report on nuclear reactors (atomic power).

Report on nuclear reactors for aircraft.

Atomic weapons effects handbook.

Source book on atomic energy.

A handbook or atomic primer, primarily for Commission employees but to be made available to the public when issued.

These new publications will be a sort of "stockholders' report" to the American people on their $3,000,000,000 atomic business, Mr. Lilienthal explained. They are a part of the AEC's program to tell as much as it can about what is known of atomic energy and its hazards and benefits.

Science News Letter, February 12, 1949

PSYCHIATRY

Workshop To Attack Mental Hospital Problem

➤ A WORKSHOP for mental hospital administrators and staff members will be the opening gun in an American Psychiatric Association drive to improve mental hospital services in the United States and Canada.

A pooling of "know-how" in meeting successfully the problems of personnel shortages, overcrowding of patients and lack of public and financial support is expected to be an important feature of the five-day institute.

Scheduled for April 11-15 in Philadelphia, the Mental Hospital Institute as it is formally termed will be under the program direction of Dr. Daniel Blain, medical director of the American Psychiatric Association. Announcement of the institute was made by Dr. William C. Menninger of Topeka, Kans., president of the association.

Science News Letter, February 12, 1949

E FIELDS

ZOOLOGY

Rattlesnake Venom Found Able To Kill Bacteria

➤ RATTLESNAKE venom will kill bacteria, H. S. Robert Glaser of Riverside, Calif., reports in the zoological journal, COPEIA (Dec. 31, 1948). He tried venom from two different rattlesnake species on culture-plates of four kinds of bacteria, with definitely lethal results.

However, for the present at least this discovery will remain one of scientific interest rather than of practical medicinal value, since no one is likely to want to treat an infection with snake venom.

Effects of the rattlesnake poison on the bacteria appear to be similar to its effects on animal cells, Mr. Glaser states: a general breakdown of the cell structure, with killing of protoplasm.

Science News Letter, February 12, 1949

INVENTION

Processed Cellophane Makes Superior Condensers

➤ CELLOPHANE is claimed superior to paper as material for condensers in radios and for similar dielectric purposes, in U. S. patent 2,460,282, newly issued to Guy B. Gardner of Fairhaven, Mass. Paper, he says, is notoriously fibrous and grainy, and contains bits of carbon, minute fragments of metal and other conducting substances that are absent from the regenerated cellulose product.

Cellophane, however, is also partially conducting in its ordinary commercial forms, primarily because it contains slight residues of ionizable chemicals. In Mr. Gardner's process, these are washed out by successive immersions and scrubbings in alcohol and distilled water.

Science News Letter, February 12, 1949

ENTOMOLOGY

Insects' Food Habits Revealed by Crop Contents

➤ FOOD HABITS of insects can be learned in exactly the same way as the food habits of birds—by studying closely the contents of their crops. For insects, like birds, possess crops—storage pouches between mouth and stomach, where the food they eat is often stored for a while before it passes on to be digested.

The new method for learning more about what insects eat is suggested in SCIENCE (Feb. 4), by the late Dr. Frederick B. Isely of Trinity University, San Antonio, Texas, and Dr. Gordon Alexander of the University of Colorado.

Microscopic examination is of course necessary to identify the food fragments found in the crop of an insect, whether freshly killed or after long preservation in a jar. However, even small fragments of leaves can sometimes be made out for what they are; and such things as pollen grains are relatively easy to identify.

As an example of revision in the list of foods favored by one insect group, the meadow grasshoppers, the two researchers state that whereas it has long been assumed that this particular grasshopper type is a general feeder on vegetation and therefore harmful, crop examinations proved that it eats mainly pollen and seeds, together with a certain amount of "meat" in the form of other insects. Meadow grasshoppers may therefore be listed as neutral, or even beneficial to man, rather than harmful.

Science News Letter, February 12, 1949

ENGINEERING

Thorium-Tungsten Tubes Give Longer Service Life

➤ A SERVICE life 50 times as long as that of the ordinary tungsten rectifier tube used in X-ray equipment is promised in new tubes suitable for high voltage which have filaments made of thorium-tungsten alloy. These new tubes have a possible use in television.

Thorium-tungsten filaments have long been used in low voltage tubes. A decade or less ago, it was thought that 5,000 volts was the maximum that could be used with them. During the war the voltage was raised to 35,000. The new tubes raise the ceiling to above 100,000 volts.

The development of the new high voltage tubes was described at the meeting of the American Institute of Electrical Engineers in New York by Z. J. Atlee of the Dunlee Corporation, Chicago. He indicated that thorium-tungsten tubes suitable for much higher voltages may be available later. Because of the very much lower work function of thorium on tungsten, 2.63 volts, as compared to the high work function of pure tungsten, 4.52 volts, much more efficient emission is obtained and at an appreciably lower temperature, he said.

Two thorium-tungsten tubes, rated above 100,000 volts, are now in production by Dunlee. Although developed particularly for X-ray generators, they may be usable in television as well as for the water-cooled power size of transmitting tubes.

Thorium is a gray radioactive metallic element which is very ductile and very resistant to atmospheric corrosion. It is not an abundant element, but considerable supplies are available in monazite sand. There is considerable interest in this metal at the present time because scientists have found that it can be used with uranium in developing atomic energy.

Science News Letter, February 12, 1949

ASTRONOMY

Giant Red Stars May Have Large Noisy Center Zone

➤ A NOISY zone millions of miles deep may be the mechanism whereby giant red stars with terrifically hot centers are able to exist.

This theory has just been advanced by Robert S. Richardson of Mount Wilson and Palomar Observatories, and Dr. Martin Schwarzschild of Princeton University Observatory.

The star's central core, which may be as hot as 30,000,000 degrees Centigrade, is quite turbulent, the astronomers estimate. It sends out noise, too low-pitched to be heard by human ears, of such strength that energy from the gaseous central core may be carried solely by this means through the surrounding layers.

Little or none of this energy is lost as it bubbles through the noise zone, where the hydrogen, helium and a small percentage of heavier elements become increasingly rarefied. All energy is saved until this acoustical noise reaches the outer envelope. Here the mechanical energy of the unheard noise at last is converted into the light and heat radiated by the star.

A star built according to this model might have a central temperature high enough for hydrogen to be converted into helium by means of the famous "carbon cycle" and yet at the same time have a radius as great as that of the biggest red giants.

Reconciliation of these two requirements to date has been the chief difficulty in picturing the internal construction of giant red stars, Mr. Richardson and Dr. Schwarzschild report in the ASTROPHYSICAL JOURNAL (Nov., 1948).

Science News Letter, February 12, 1949

DENTISTRY

Tooth-Decay Prevention With Treated Sugar Fails

➤ HOPE of preventing tooth decay on a mass basis by adding a rare chemical to sugar at the refineries fades with the latest report from research laboratories.

The rare chemical is glyceraldehyde. When added to a standard test ration for rats during a 14-week period, the chemical failed to slow the usual rate of tooth decay or curb its extent, Dr. James H. Shaw of Harvard School of Dental Medicine in Boston found.

A strain of rats specially bred for susceptibility to tooth decay at a rate approximating that in humans was used in the studies. On a standard purified diet decay will appear in these rats at predictable intervals.

The only two pounds of glyceraldehyde in the world were obtained for the Harvard studies by Dr. Robert C. Hockett, Scientific director of the Sugar Research Foundation.

Science News Letter, February 12, 1949

CHEMISTRY

Wetter Water Checks Fires

This important new fire-fighter has the power to penetrate well into burning materials. Other weapons include fog-foams and fire-extinguishing chemicals.

By A. C. MONAHAN

➤ WATER alone, foe of fire, is losing its rank as the number one fire fighter. Wetter water, fog-foams and fire-extinguishing chemicals are taking its place. Chemistry is playing an important part in fire-fighting and in fire prevention.

It has long been realized that fire-fighters need a more effective and less destructive weapon than water. Water frequently does more damage than the fire it puts out. This accounts for the popularity of carbon dioxide gas, used for years to fight fire. This heavier-than-air non-combustible gas smothers fire by keeping oxygen away. In major fires its usefulness is limited.

Important among the newer weapons against fire is what is called wetter water. This is ordinary water to which chemicals have been added that give it power to penetrate well into burning materials to the regions where the combustible gases form.

Fog-foams are particularly effective for gasoline and oil fires which have become more common with the present wide use of these fuels. Some of the newer gases are more suitable for fire-fighting under certain conditions than the carbon dioxide standby.

These chemical fire-fighters are not new in the sense that their use has just been discovered. But during the past few years improved chemicals and methods of application have been developed.

Fire Losses Greater Now

New weapons for fire-fighting are of great importance at the present time. Annual losses by fire are much greater now than in the prewar years. These increased losses are not due merely to inflated property values. The actual number of fires has increased, and this applies to conflagrations as well as small fires. Needless destruction of property and resources by fire in the United States runs considerably over $2,000,000 a day.

Using chemicals to make water penetrate deeper into materials to which it is applied is used in washing clothes as well as in fire-quenching. This so-called wetter water gets rapidly into burning materials, through wood char, wall-board, upholstery, baled cotton and paper, to the zone where heat is causing the formation of combustible gases to add to the fire.

There are now several commercial preparations available for the purpose. One, for example, is the Unox Penetrant of Carbide and Carbon Chemicals Corporation which is said to have exceptionally high penetrating action. A one-percent solution, that is, one gallon of the preparation to 100 gallons of water, is sufficient for Class A fires. These are fires in which smoke and gases are formed below the surface of the burning material. Another is Drench, manufactured by the fire specialties division of Arnold-Hoffman, Providence, R. I.

In extensive tests on the fire-extinguishing effectiveness of chemicals, conducted by the U. S. Forest Products Laboratory, Madison, Wis., just before the war, a long list of chemicals was used, all of which had some value. Potassium acetate, potassium bicarbonate, and potassium carbonate have pronounced flame-extinguishing capacity. Phosphoric acid, diammonium phosphates, monoammonium phosphates, and boric acid have pronounced glow-extinguishing and total-extinguishing capacity. Other chemicals that showed lower but distinctive total-extinction effectiveness in concentrated solutions include ammonium sulfate, lithium chloride, magnesium chloride and zinc chloride.

Increase In Fuel-Use

With the tremendous increase in the use of gasoline, fuel oils and other petroleum products in engines, heating, cleaning and other applications, a special fire-fighting problem is presented. Water is not effective in killing an oil or gasoline fire. Fog-foam seems to be the answer.

The so-called Navy bean soup, used on shipboard and other places by the U. S. Navy where gasoline and oils are used in large quantities, is made from soybeans, fish scales and iron salts. When applied with water through jets to produce a fine mist-like spray, it can be spread several inches thick to seal in combustible gases and seal out oxygen.

The snowy bubbles last for hours; their adhesive qualities make it stick to anything, and even high wind will not blow it away. Fog-foam fire-fighting systems are now installed on Navy aircraft carriers, and also on fire-fighting tugs for killing fires on other vessels or in harbor neighborhoods.

One important use of this mechanical foam is in fighting fires in above-the-ground giant storage tanks where petroleum or its products are stored for distribution or held for processing. In this case the fog-foam may be pumped into the bottom of the burning tank through the oil pumping line itself. When applied in this manner, it arises through the oil, cooling it below ignition temperature, thus killing the fire.

In another method of application the fog-foam is poured onto the flames through fixed lines that discharge against the sides of the tank. In a relatively recent test made by the Standard Oil Company of Ohio, a 93-foot diameter tank of crude oil was deliberately set afire. The fire was extinguished in four minutes by a blanket of foam fed through six lines at the rate of 15,000 gallons a minute.

Carbon dioxide has been, and still is, the principal fire-extinguishing gas used in household and factory extinguishers, and also in the gas-delivering city fire department equipment. However carbon tetrachloride is also used. Wider installations of these effective extinguishers would lessen greatly present fire losses.

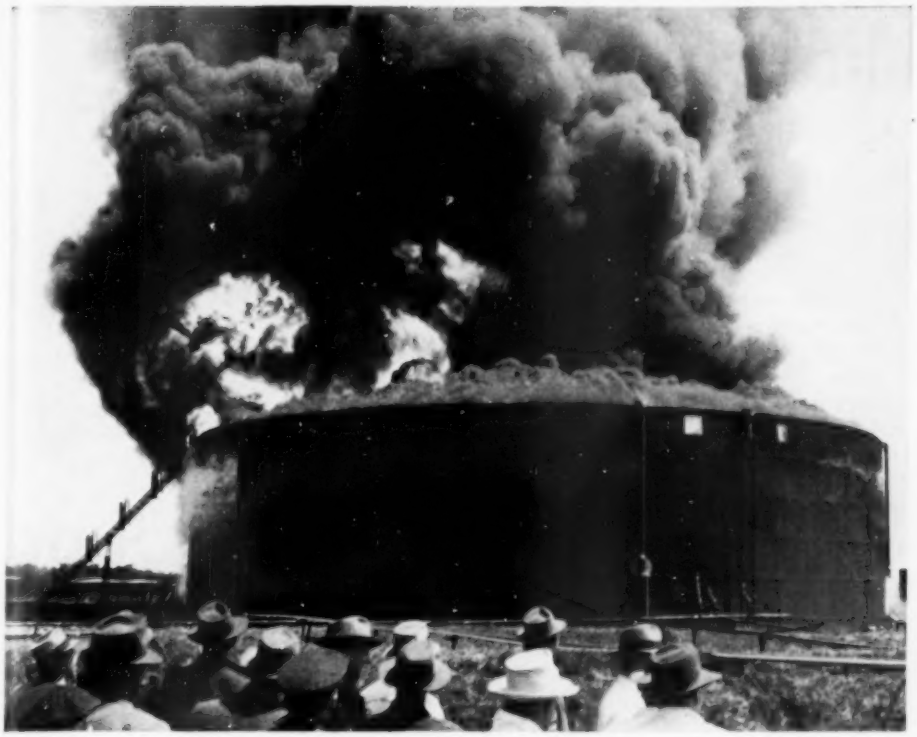
Efficient Fire-Extinguisher

Methyl bromide has long been advocated as a fire-extinguisher, particularly for aircraft engine fires. It is said to be the most efficient extinguishing agent commercially available, from 20% to 100% more effective than carbon dioxide, but this gas is poisonous. Also it is highly corrosive and can not be used in contact with certain metals, among which is aluminum. It is being used to a certain extent, but not for fires in passenger or crew compartments.

Among the fire-extinguishing gases are the fluorine-chlorine-methane gases known as Freons, widely used in refrigerators and air-conditioning equipment. They are harmless to men, being non-toxic, non-combustible, non-explosive and non-irritant.

The U. S. Bureau of Mines recommends

FIGHT FIRE WITH FOG—This nozzle jet for fire-fighting fog is made of a molded, shatterproof plastic.



MECHANICAL FOAM QUELLS FLAMES—A crude oil fire in a giant Standard Oil storage tank was quickly extinguished with mechanical foam delivered inside the tank by six-inch vertical pipes on the outside of the tank.

one of the Freons, Freon 11, for use in extinguishing gasoline fires around mines, a rather common occurrence. In tests with six gases on three different types of gasoline, it found Freon 11 most effective. The other gases tested were Freon 12, Freon 21, carbon dioxide, automobile-exhaust gas and nitrogen. They were effective in fire-extinguishing in the order named.

Most every fire has a small beginning. Careless persons are responsible for many. Discarded glowing matches and butts of cigarettes cause more fires than any other single cause, it is claimed. The use of non-combustible materials, and others made fire-resistant by chemical treatment, would kill many fires caused by carelessness or otherwise, right at their start. These chemical treatments are for both woods and textiles.

Chemists have worked for years to develop compounds which will render organic materials fire-proof or fire-resistant. They have met with considerable success. Wood, clothing, draperies, and other articles made of textiles can be made sufficiently fire-retardant to make their extended use almost compulsory.

Wood is treated both by impregnation and by coatings. A paint containing ammonium phosphate gives wood an excellent fire-resisting finish. Cementiferous paints developed in England are claimed to have high value.

Cloth is made less of a fire hazard by what are known as flame retardants and glow retardants. Some give temporary protection only, and others a relatively permanent protection. Of the water-soluble flame retardant compounds, borax and aluminum sulfate have long been used. They are said to be less effective, however, than such mixtures as borax and boric acid, and those of either borax or boric acid, or both, with diammonium phosphate or sodium phosphate.

Other flame retardants include various phosphoric acids or salts; sulfamic acid; ammonium sulfamate, sulfate and molybdate; zinc chloride, aluminum oxychloride and several mixtures of these or other chemicals. The water-soluble glow-retardants are largely boric and phosphoric acids and their acid salts. For durable treatment, a urea-phosphate type of treatment is employed, also a metallic oxide-chlorinated body type.

The many textile treatments to render fabrics less of a hazard from fire, and how they act, are beyond the understanding of most persons except chemists. The point is, however, that there are successful methods of treating clothes and other fabrics that greatly decrease their danger from fire, and their wider use would prevent many destructive fires and save many lives.

Science News Letter, February 12, 1949

Rhododendrons and azaleas are generally regarded as two distinct types of plants but both belong botanically to the same genus; for convenience the ones with evergreen leaves are called rhododendrons and those with deciduous leaves azaleas.

"The whole world is queer except thee and me, and sometimes even thee seems a little queer"

HANDBOOK OF PSYCHIATRY

by Winfred Overholser, A.B., M.D., Sc.D.
and Winifred V. Richmond, B.S., A.M., Ph.D.

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To such clarification this book is aimed, and the following subjects are discussed: the difference between psychology and psychiatry, the development of psychiatry and psychoanalysis, the role of psychiatry in daily life, and various mental illnesses and their treatment.

The reviewers have said of this book: ". . . it would probably be difficult to find a more admirable 'first reader' in psychiatry;" ". . . a sensible and authoritative discussion of the modern concepts of psychiatry . . . well documented, simply worded, and carefully prepared;" ". . . understandable to the laity and also informative to the expert."

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PSYCHOLOGY

What Does Stalin Propose?

Psychologists differ in their interpretation of the meaning of Stalin's proposal for a meeting between himself and President Truman.

➤ IS STALIN'S proposal for a meeting between himself and President Truman a hope for breaking up the ice of the cold war? Or is it a clever political move designed for propaganda effect on the Scandinavian countries? Psychologists, like the public, have differing opinions.

Psychologically, there would be advantages in having the two top men in Russia and the United States meet together on an informal basis. Former President Roosevelt saw those advantages and used them very successfully.

Any emissary of either the United States or Russia going to a meeting must go with a set policy to which he is in duty bound to stick. Even Vishinsky, one psychologist pointed out, could not afford to face Stalin if he backed down from the position settled upon in advance. Stalin, himself, would not be so handicapped; he would be free to alter his position if necessary.

And it is much easier, it was pointed out, for individuals to come to an agreement, or at least to take steps approaching it, if they are meeting informally. In any formal meeting of an institution such as the United Nations assembly, individuals are hampered in expressing themselves freely and in changing their positions.

There are two ways of looking at the cold war. One is that the whole thing is planned as a long-scale offensive. Those who hold this view see the Stalin peace proposal as just another move to stall for time while the Communist gains in China are consolidated and fitted into the general pattern.

The timing is right to serve in the psychological offensive to prevent the Scandinavian countries from signing the North Atlantic agreement. Since the days of Lenin the Russians have had a single inflexible aim—the victory of the World Revolution, it is pointed out. Although what they do varies from year to year and from day to day, each action must be suited to the same inflexible purpose.

Other psychologists are skeptical that human behavior can be so consistent and due to such foresight. It is an over-simplified explanation of the cold war. Much more likely, they feel, is that one action leads to reprisals and that in turn to counter-action in a spiral. If you see it in this light, you may think of Stalin's proposal as indicating his realization that he has gotten himself in deeper than he intended to and wants to find a graceful way out.

Hope for success in future negotiations with Stalin is seen by some in the fact that although the basic difference between the U. S. and the U.S.S.R. is over ideas and ideals, the controversies so far have not been ideological discussions. They have been over very specific practical matters for which, theoretically at least, some mutually agreeable solution could be found.

Science News Letter, February 12, 1949

NUCLEAR PHYSICS

Subatomic Merry-go-round

➤ A SUBATOMIC merry-go-round in which an electric current runs round and round the heart of the atom is described in the fifth semiannual report of the Atomic Energy Commission. This new evidence of what goes on in the heart, or nucleus, of the atom comes from measurement at Argonne National Laboratory in Chicago of the magnetic moments of two unusual varieties of elements. These were recently made available in quantities large enough for study.

The elements are heavyweight hydrogen 3, also known as tritium, and lightweight helium 3. Each of these varieties has a magnetic moment about 10% higher than would be expected from atomic theory. Since magnetism is closely related to an electric current, scientists believe they now have a clue to how protons and neutrons in the heart of the atom pass an electric charge back and forth between them. Other evidence has indicated that they do.

If the electric current coursing around the heart of the atom is thought of as the merry-go-round, the charge could be the brass ring.

The rider snatches it from the post. In this case the post is inside the circle, in the nucleus of the atom. The post, losing its charge, becomes the "proton". At another part of the circle the rider drops the ring into the basket. Here regaining the ring restores a charge to the inner particle. It is now a "neutron".

How the charges are shifted around inside the nucleus is unknown, but the current in its circular course keeps changing the state of charge on the particles the physicist can measure.

Science News Letter, February 12, 1949

AERONAUTICS—PHOTOGRAPHY

Airborne Dark Room

➤ AIRBORNE photographic laboratories, equipped with a new processing machine capable of turning out 20,000 complete prints in a day, are promised for quick work in forward military areas. The complete, compact dark room would occupy the detachable fuselage of a Fairchild C-120, a version of the Flying Boxcar.

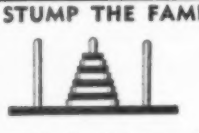
This type of plane has been compared with the modern truck-trailer from which the cargo carrier is quickly detached from the power unit. However, it is not a trailer. The cargo body is attached tightly in place snugly under the special plane itself, the built-in body of which is entirely for power and crew. The plane can land the cargo body wherever wanted, and then take off to pick up another body, or to travel to where needed without a cargo fuselage.

Only one of these so-called photo multiprocessors, which uses assembly line methods of producing prints, has as yet been built. It is at the Wright-Patterson Air Force Base in Dayton, O., and was built for the Air Force by Technical Service, Inc., Plymouth, Mich. When assembled for use, it is 31 feet long, 17 inches wide, and approximately five feet high. The device is made up of separate units which contain previewer, printer, developer, spray rinse, hypo bath, wash tanks and infra-red radiation air drier.

In printing, the processed aerial strip film is fed into one end of the machine. Movement of the negatives and dodging, which is achieved with the help of 24 lights, is operated manually. Paper advances automatically as the negatives are moved forward through the various chemicals and wash tanks. At the end of the multiprocessor, film or finished photographs come out again, the film ready for storage and the paper already cut into individual prints.

Science News Letter, February 12, 1949

STUMP THE FAMILY GENIUS



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Material to be sent is placed before an RCA "flying spot" scanner, and transmitted by ultra-high frequency radio signals. Miles away the pictures appear on a picture tube and are photographed. Negatives are ready for printing or projection in 40 seconds.

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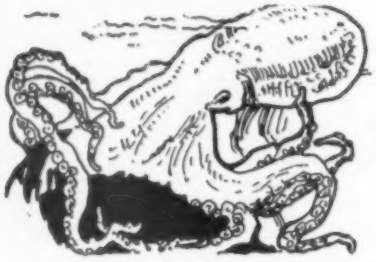
ZOOLOGY

NATURE RAMBLINGS

by Frank Thone



Maligned Monster

➤ WHEN a newspaper columnist of another generation wrote,

"Though full of arms, the octopus
Is never called an arsenal;
In fact, some names they call the cuss
Won't do to put in print at all," he was (quite unintentionally, to be sure) maligning one of the shyest, most retiring of all the citizens of the sea. True, the creature is often called "devil-fish"—a name much more appropriately claimed by the great horned manta, or giant ray—but there is really nothing especially devilish about him. He hides in chinks between rocks or cavities in the coral, quite as much for his own safety as to enable him to nab such incautious lobsters, crabs and other items of sea-food as may venture within reach of his sucker-covered arms.

Menace to man the octopus certainly is not, at least so far as American coastal waters are concerned. Biggest specimens reported from our shores have an arm-spread of six or eight feet—and no inclination to use it on anything so big as a human bather or diver. There is said to be a giant octopus on the Australian coast, with a "reach" of 40 feet; this species may very well be dangerous. But vacationers in our winter beach resorts need be on the lookout for only two really aggressive and dangerous sea creatures—the barracuda and the moray or sea-eel. They may safely ignore all but the very largest sharks—which are very rarely seen in our waters anyway—and they can forget all about the octopus.

Indeed, if anyone is entitled to present a bill of complaint on account of a tendency to seize and devour, it would be more appropriate for the octopus to prefer such charges against the human species. In the fish markets of the Mediterranean region and the Far East, small octopuses are common objects of sale, as are also their free-swimming relatives, the squids. The peoples of those regions cook them in various ways; and even American and British naturalists who have tried them say they can be very tasty when properly prepared.

There is no logical reason why we shouldn't relish a dish of octopus or squid. Almost all of us like oysters and clams; abalones and mussels, too, when we can get them. Gourmets of Gallic taste delight in roasted snails. All these sea animals are mollusks, belonging to the same great zoological group as octopuses and squids. Indeed, they might even be called their poor relations, for these many-armed mollusks are considered by zoologists as the most advanced forms of their kinship. So if we readily eat oysters, yet turn up our noses at a dish of octopus, we are behaving very much as we would if we were to accept fish but reject beefsteak.

Science News Letter, February 12, 1949

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PUBLIC HEALTH

Voluntary Health Plans

➤ FARM leaders favor voluntary health insurance rather than national insurance through the federal government, it appears from statements at the National Conference on Rural Health in Chicago. The conference is sponsored by the American Medical Association.

Said H. E. Slusher, of Jefferson City, Mo., chairman of the American Farm Bureau Federation rural health committee:

"We favor voluntary plans providing medical, health, dental and hospital insurance."

The Bureau, he added, has not recognized "the need for nor feasibility of a national compulsory health insurance program."

The Grange, according to Joseph W. Fichter, Columbus, Ohio, master of the Ohio State Grange, wants: 1. contributory health insurance as the basic method of financing medical care for the large majority of American people, with tax funds as required to furnish services which are public responsibilities and to supplement health insurance where necessary; 2. voluntary prepayment group health plans on a community or collective bargaining level embodying group practice; and 3. removal of legal restrictions on voluntary insurance plans on a cooperative basis, such as now exist in a number of states.

Encouragement of prepaid medical, hospital and dental care on a voluntary basis was given as one of four points in the program of the National Cooperative Milk Producers Federation, a marketing organization for dairy farmers in 47 states. Its program was presented by Mrs. Margaret K. Taylor of Washington, educational director of the federation.

A Department of Human Resources in the federal government, corresponding to the Departments of Agriculture and Labor, is wanted by the Farmers Educational and Cooperative Union of America, Mrs. Gladys T. Edwards, Denver, Colo., educational director of the union, said.

"If medical service can be made available only by act of the national Congress, it is my opinion that we have made the first step toward completely controlled social and economic life and have given up the right to take free action in this country," declared Aubrey D. Gates, associate director of the Arkansas Agricultural Extension Service.

He stressed the need for "study and discussion, give and take, and of compromise" to meet rural health and medical problems.

More public health units, more preventive medicine and more doctors for rural areas were stressed by all the speakers.

Science News Letter, February 12, 1949

Science Service Radio

➤ LISTEN in to a discussion on "Our Scientists of Tomorrow", interviews with eight of the 40 winners of the Eighth Annual Science Talent Search, on "Adventures in Science" over the Columbia Broadcasting System at 3:15 p.m. EST, Saturday, Feb. 19. Eight talented teen-aged youngsters, winners of Washington trips, will be guests of Watson Davis, director of Science Service. The high school winners will tell in their own words what interests them most in the world of science. Some will describe the experiments they set up—others will also tell of future plans and ideas.

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Books of the Week

TO SERVE YOU: To get books, send us a check or money order to cover retail price. Address Book Dept., SCIENCE NEWS LETTER, 1719 N St., N. W. Washington 6, D. C. Ask for free publications direct from issuing organizations.

THE AMPLIFICATION AND DISTRIBUTION OF SOUND—A. E. Greenlees—*Chapman and Hall (Sherwood)*, 2d ed., 302 p., illus., $6.00. A book of British origin for engineers and owners of sound equipment.

ANIMALS WITHOUT BACKBONES: An Introduction to the Invertebrates—Ralph Buchsbaum—*University of Chicago Press*, rev. ed., 405 p., illus., $6.50. In this revision of a most interesting text, 150 new photographs have been added to the gorgeous collection the book already contained, and a chapter has been added on advanced invertebrate zoology.

THE AVIAN EGG—Alexis L. Romanoff and Anastasia J. Romanoff—*Wiley*, 918 p., illus., $14.00. An attempt to bring together in one volume all the known facts about birds' eggs. An exhaustive and scholarly work.

CAUSES OF INDUSTRIAL PEACE UNDER COLLECTIVE BARGAINING: Case Studies 4—Hickey-Freeman Company, Amalgamated Clothing Workers of America—Donald B. Straus—*National Planning Association*, 85 p., paper, $1.00.

THE EFFECT OF CARBOHYDRATES ON EXPERIMENTAL CARIES IN THE RAT—Gerald J. Cox, Mary L. Dodds, Margaret Matuschak Levin and Harold C. Hodge—*Mellon Institute*, 16 p., illus., paper, free on request to publishers at University of Pittsburgh, Pittsburgh 13, Pa.

ELEMENTS OF ELECTROMAGNETIC WAVES—Lawrence A. Ware—*Pitman*, 203 p., $3.50. A college text.

HELPING FAMILIES PLAN FOOD BUDGETS—Bureau of Human Nutrition and Home Economics—*Govt. Printing Office*, 16 p., paper, 15 cents. Prepared in response to requests by food economists for such a manual. Especially for nutrition leaders and teachers.

HISTORICAL GEOLOGY—Carl O. Dunbar—*Wiley*, 567 p., illus., $5.00. A beautifully illustrated text on the history of the earth and the creatures that long ago lived on it.

AN INTRODUCTION TO COMPARATIVE BIOCHEMISTRY—Ernest Baldwin—*Cambridge (Macmillan)*, 164 p., illus., $1.75. A small, readable book of British origin intended for college students and general readers "whose interest may be great but their leisure small."

THE LIFE STORY OF THE FISH: His Morals and Manners—Brian Curtis—*Harcourt, Brace*, rev. ed., 284 p., illus., $3.75. Answering such questions as; Is a fish colorblind? Does he feel pain? How fast does a salmon swim? You will be interested whether you are angler, home aquarium keeper or science-minded layman.

THE STRUCTURE OF MATTER—Francis Owen Rice and Edward Teller—*Wiley*, 361 p., illus., $5.00. Intended to indicate the scope of phenomena, from stars to atom nuclei, that can be explained by the help of quantum mechanics, and to do this with a minimum use of mathematics.

STUDY ABROAD, INTERNATIONAL HANDBOOK OF FELLOWSHIPS, SCHOLARSHIPS AND EDUCATIONAL EXCHANGE, VOLUME I, 1948—United Nations Educational, Scientific and Cultural Organization—*Columbia University Press*, 224 p., paper, $1.00. The first of a series of volumes providing details of all available opportunities to travel outside one's own country for study or research. This volume lists 10,500 opportunities for study in 27 countries.

SWEEPER IN THE SKY: The Life of Maria Mitchell, First Woman Astronomer in America—Helen Wright—*Macmillan*, 253 p., illus., $4.00. In 1831, at the age of 12 years, Maria Mitchell was observing with her father an annular eclipse of the sun. She devoted her life to astronomy, education, and to improving the place of women in the scientific world.

Science News Letter, February 12, 1949

PHYSICS

Magnetic Fluid Clutch

➤ MAGNETIC OIL is the key to a new magnetic fluid clutch, the mechanism that connects the engine shaft with the shaft that drives the wheels of an auto. Such a clutch is suitable not only for automobiles, but for many other types of machinery.

The magnetic oil is made by mixing ordinary oil with iron dust, producing a special mixture containing millions of tiny particles of iron. The electric system magnetizes them as needed.

The electromagnetic fluid clutch, developed at the National Bureau of Standards, is relatively simple. In its basic form, it has only four elements—a driving shaft with a plate at its end, a driven shaft and plate, the iron-oil mixture between, and a coil to magnetize the mixture.

Current passed through wires, which may be wound inside the driving disk, establishes a magnetic field between the two parallel plates. The iron-oil particles, in the space between the plates, form chains which bind the two plates together. Described as extremely smooth in operation, the electromagnetic fluid clutch was invented by Jacob Rabinow, chief of the ordnance mechanics laboratory at the Bureau.

The electromagnetic fluid clutch is extremely smooth in action because all contacting surfaces, both the plates and the carbonyl iron powder, are coated by a lubricant. When the iron-oil mixture is unmagnetized, it permits the engine to turn independently of the wheels, as when the clutch in an ordinary car is released. When the electromagnet is turned on, iron and oil in the magnetic field seem to solidify to connect the moving parts just as a standard clutch does when it is engaged.

Some idea of how this clutch works may be secured in the home laboratory. A little iron powder, mineral oil, magnet wire, battery or other source of electricity, and a large wooden spool are all the equipment needed.

Such simple apparatus will enable you to pull up peaks of the magnetized fluid, which peaks continue to rise above the surface until the current is cut off. You can turn upside down a container full of the iron-oil mixture and little if any will run out; yet the liquid rushes out when the current is disconnected. A long nail, which turns freely in the unmagnetized liquid, can be used as a handle to turn a large spool of wire by putting the electromagnet into operation.

This shows the principle on which the electromagnetic fluid clutch operates. When the current is on, the engine shaft and the shaft that drives the wheels turn together as if one; when the current is off, one turns free of the other.

A tiny magnet and a vial containing carbonyl iron powder have been collected for you by Science Service. You can obtain these specimens, along with full instructions as to how to perform fundamental experiments in magnetism and how to show the principle upon which the electromagnetic fluid clutch is based. Just send 50 cents to Science Service, 1719 N St., N. W., Washington 6, D. C., and ask for the Magnetic Kit.

Science News Letter, February 12, 1949

PUBLIC HEALTH

U. S. Influenza Vaccine Can Fight Type in Europe

➤ THE U. S. anti-influenza vaccine will be effective against the type of influenza now present in European countries if it spreads across the Atlantic.

This is the opinion of Dr. Christopher H. Andrewes, head of the World Health Organization's World Influenza Center at Hampstead, England.

The virus causing 'flu in Europe now is the variant of Type A Influenza which appeared in 1947, Dr. Andrewes has found preliminarily. This type was added to U. S. commercial vaccines after its appearance.

Influenza has been epidemic in Holland, France and Italy. There has been a little in England. In Paris one out of every four persons has been stricken, according to best French estimates.

There is some question now whether the European 'flu outbreak will spread to the United States before the end of the normal influenza season there. So far, it has been spreading very slowly if at all across the Atlantic.

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Ramie, fiber used for cloth for centuries in Egypt, promises to become an important American product, being now grown in Florida and California; the plant produces the toughest of all vegetable fibers.

• New Machines and Gadgets •

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., Washington 6, D. C. and ask for Gadget Bulletin 452. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

⚙ *ELECTRIC MIXER and egg-beater can be easily carried about the kitchen to wherever needed. A light-weight plastic casing, from which the mixing shaft projects, is small enough to be grasped in one hand but large enough to hold an operating motor when plugged into an electric outlet.*

Science News Letter, February 12, 1949

⚙ *HANDBAG for women can be used as is or with a reversible plastic covering which can be quickly snapped on or off. Each side of the cover is a different color, both different from that of the bag itself, thus providing means of obtaining color harmony between bag and costume worn.*

Science News Letter, February 12, 1949

⚙ *REAR-VIEW MIRROR, theft-proof when the automobile doors are locked, is easily attached to the door-top by means of a single screw clamp, without the necessity of boring a hole. It is quickly adjusted to individual needs from the inside by a hand extending through the window.*

Science News Letter, February 12, 1949

⚙ *PORTABLE TELEVISION set, shown in the picture, resembles a piece of modern luggage when closed and covered. Weighing only 33 pounds, it has a seven-inch tube and a telescoping aerial which in use is set in a jack on top, and in storage is put away in the case's removable lid.*

Science News Letter, February 12, 1949

⚙ *STILTS for the youngster have adjustable steps that may be used at either six or 12 inches from the ground, making it possible for all age groups to learn to walk on them without danger. The stilts themselves are clear spruce; the foot-rests are metal triangles, held in place with bolts.*

Science News Letter, February 12, 1949

⚙ *LOW-TEMPERATURE insulation, particularly for use on tanks and pipes used by oil and chemical industries, is made of mineral wool and a resin binder. It is an inorganic material that combines high fire resistance, immunity to many organic solvents, and moisture resistance with low heat conductivity.*

Science News Letter, February 12, 1949

⚙ *WASHABLE SHELF PAPER, available in many colors, has a coating of polyethylene which makes it water-proof and grease-resistant. It comes in 14-inch width for pantry shelves and 21-inch width for drawer lining.*

Science News Letter, February 12, 1949

Do You Know?

An automatic traffic *control system* in New York City synchronizes about one-fourth of all traffic signals in Manhattan.

The term *phosphor* is applied to various materials that will absorb invisible ultraviolet radiation and convert it into visible light.

"Grassland farming" is a relatively new expression; it means keeping more land in grass more of the time, and some land in grass all of the time.

Ten *planes* carrying purebred livestock purchased by the Guatemalan government were flown recently from Houston, Texas; included were cattle, horses, sheep, goats and some Missouri jacks.

The staple food of *alligators* is crayfish to which real fish, turtles and watersnakes may be added; only the big ones, as a rule, can manage meals of warm-blooded meat, such as birds and muskrats.

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